PATENT

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Application No.: 09/500,624

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Applicant: Dean Amburn

Group Art Unit: 3628

Examiner: Harish T. Dass

Title: Method And Apparatus For Automated Trading of Equity Securities Using A Real Time Data Analysis

Attorney Docket: 2425-000001

Director of The United States Patent and Trademark Office
P.O. Box 1450
Alexandria, Virginia 22313-1450

DECLARATION OF DEAN W. AMBURN UNDER 37 C.F.R. 1.131

Sir:

In compliance with 37 C.F.R. § 1.131, the purpose of this Declaration is to establish conception of the claimed invention in the above-identified patent application (hereinafter "the Subject Application") in the United States, prior to January 14, 2000, which is the filing date of the Sposito reference (Pub. No. US 2001/0042033A1) and subsequent diligence pursuing the claimed invention until a constructive reduction to practice as evidenced by the filing of the Subject Application. The Sposito reference was cited by the Examiner in an Office Action dated August 1, 2003 for the Subject Application.

I, the undersigned, do hereby declare:

1. That I am the named inventor for the claimed subject matter of the Subject Application.

2. That prior to January 14, 2000, I had conceived, in the United States, the subject matter claimed in the Subject Application.

3. That the attached document (Attachment A) is a draft disclosure of the idea of the Subject Application which bears a date prior to January 14, 2000 and evidences conception in the United States of the claimed invention prior to January 14, 2002, the filing date of the Sposito reference.

4. That the invention was diligently pursued from prior to January 14, 2000, to a subsequent constructive reduction to practice as evidenced by U.S. Patent Application Serial No. 09/500,624 which was filed on February 9, 2000.

5. The diligence was exhibited by numerous events which transpired from before January 14, 2000 to February 9, 2000; some of these events are highlighted below:

Prior to 1/14/2000: I had contacted a patent attorney for pursuing patent protection for the subject matter claimed in the Subject Application. I met with the patent attorney and provided him with draft disclosures including Attachment A. At the end of December, 1999, the patent attorney prepared a draft patent application and provided it to me to review.

1/2000 - 2/9/2000: The patent attorney and I worked on reviewing, editing and finalizing the Subject Application.

6. I have never abandoned the patent application.

7. I hereby declare that all statement made herein are of my own knowledge and are true and that all statement on information and belief are believed to be true; and, further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the Subject Application or any patent which issues thereon.

Dated: 12/17/2003

Dean W. Amburn

Rough Draft 4
By Dean Amburn
[redacted]

Method and apparatus for automated trading of equity securities with user defined decision-making process using analysis of real-time data for securities and market

Abstract

The present invention is a method and apparatus that will automate the buying and selling of equity securities through a computer. The present invention monitors for a specific equity security in real-time its price, bids, asks, spread, volume traded and activity of market makers or specialists. The system analyzes this data together with other market indicators to determine when to purchase, sell or sell short a security. The system then automatically sends an order to buy, sell, or sell short a security. Once a transaction is initiated the system will continue to monitor the market for the security and determine when to reverse the initial transaction i.e. sell a bought security or buy to cover a shorted security. The system offers the user flexibility to modify the way it will determine when to buy or sell. The user defines the decision process through development of a decision model to determine when to buy, sell, sell short or buy to cover. This involves selecting levels of decision, components to consider, their relationship and decision trigger points. In a preferred embodiment the present invention will receive and analyze recent historical data for a security in order to predict future movement of the security. This system can also operate in a learning mode where the results of a decision model can be analyzed without entering into a transaction. The system maintains a database of transaction activity and databases of information for selected securities. The method and apparatus of the present invention has applications on the Internet and other high-speed data transmission systems.

References Cited
U.S. Patent Documents

4,674,044	6/1987	Kalmus, et al.	364/408
5,101,353	3/1992	Lupien, et al.	364/408
5,297,032	3,1994	Trojan, et al.	364/408
5,313,560	5/1994	Maruoka, et al.	395/54
5,732,397	3/1998	DeTore, et al.	705/1
5,950,176	9/1999	Keiser, et al.	705/36

Other References

Robert D. Edwards and John Magee, Technical Analysis of Stock Trends, 7th Ed., 1998.

Rough Draft 4
By Dean Amburn
November 8, 1999

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Robert D. Edwards and John Magee, Technical Analysis of Stock Trends, 7th Ed., 1998.

Charlie F. Wright, Trading as a Business, 1998.
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Claims

1. A method for using a computer to facilitate automated trading of equity securities comprising: inputting into the computer the identity of specific securities to track; activating the monitoring in real-time of the market for the security; automated creation and transmitting of a buy, sell, or sell short of a security; continued monitoring of the transacted security; reversal of the initial transaction; and maintaining data on the completed securities transactions and market data for selected securities.

2. A system as in claim 1, wherein real-time data for a security is monitored including (if available): price; current bids; current asks; number of bids; number of asks; number of shares on the bid side; number of shares on the ask side; spread between bid and ask; identity of market makers; and, volume of sales traded.

3. A system as in claim 1, wherein broader market indicators are monitored including but not limited to: NASDAQ volume and level; Dow volume and level; NASDAQ futures price and volume; and S& P 500 futures price and volume.

4. A system as in claims 1, 2 and 3 that will monitor the market for trends or momentum in the price of a security and determine if and when to purchase, sell, or sell short a security.

5. The method of claim 1 that is intended to automatically buy a security when the trend or momentum of the security price is going up and sell or sell short a security when the trend or momentum of the price is going down.

6. The method of claim 1 that allows the user to select the parameters deemed significant by the user and implement them into the decision making process. The user can select from parameters outlined in claims 2 and 3. Traditional technical analysis indicators can also be incorporated.

7. The method of claim 1 that allows the user to enter into the system parameters for setting the weight given in the decision making process for the market indicators as outlined in claims 2 and 3 in order to determine when to enter into a transaction.

8. The method of claim 1 that once a transaction is entered into continues to monitor in real time the market for a security as outlined in claims 2 and 3 for continued trends or momentum of the stock and determines when to exit out of the transaction with a corresponding sell, or buy to cover.

9. The method of claim 1 that immediately upon purchase of a security or selling short of a security establishes a "floating stop" to exit out of the transaction if it is determined that the prevailing trend or momentum for the price of the security is reversing direction from the trend being followed.

10. The method of claim 9 that allows the user to enter the price differential from current price to establish the outer limit of a floating stop. For purpose of illustration a floating stop of 1/4 point can be established to prevent the purchased security from drifting lower than 1/4 point from the prevailing security price. The floating stop locks in profits for a stock trending higher that reverses direction and limits losses for a stock trending lower.

11. The method of claim 1 that transmits orders for buying, selling, and selling short of a security through an Internet brokerage or through electronic communication networks (ECNs) including by way of illustration but not limited to Instinet, Island, Bloomberg or Teranova.

12. The method of claim 1 that will provide consistent analysis and decision making in the transaction of securities but which can be adjusted by the user to change its decision making process in order to adjust and better take advantage of trends momentum of a specific stocks and maximize trading profits.

13. The method of claim 1 in a preferred embodiment that will analyze historical data for a security and determine the probability of incremental movements of the price of the security and use this information in the decision making process for entering or exiting a transaction.

14. A system as in claim 4 that will route the transaction to where it will be executed quickly and with the least amount of delay or slippage.

BACKGROUND AND SUMMARY OF THE INVENTION

There are dozens of software programs available to the individual trader or investor that analyze various data and make recommendations as to what securities to purchase and when to purchase them. Other software programs create "trade stations" to facilitate the execution of buy or sell orders through the Internet or other means. However, none of these systems available to the individual trader or investor are designed to monitor the market of a specified security, determine when to purchase or sell the security and then automatically, with no intervention of the user, send a buy or sell order to the stock market. Further, none of these systems allow for user defined implementation of automated decision-making models.

The objective of the present invention is to automatically buy, sell or sell short equity securities. Unless otherwise indicated the term securities refers to equity securities.

The objective and expected value of the instant invention is that it will quickly identify and react to trends or momentum in price movement for a security. It is intended to catch the trend or momentum at an early stage and follow it until the system determines to exit.

Another objective of the instant invention is to analyze the probability of continued movement of the price for a security and quickly enter a transaction where the probability of success is high. However, it is assumed that there will be losing trades or drawdown as there is no absolute way to gauge the future trend or momentum of a security.

This system in not intended to make a market in a security or to automate the activities of a market maker or market specialist. It may however, be used to follow the actions of a market maker.

The present invention does not consider company fundamentals such as earnings, P/E, or balance sheets. Nor does it look to company news or long term historical data. The system user is required to determine what securities will be monitored by the system for trading. The decision as to what securities to monitor will be based more on its volatility and liquidity than its fundamentals.

The instant invention is also fundamentally distinguishable from what is commonly referred to as "program trading." Program trading as defined by the Big Board involves the simultaneous buying and selling of at least 15 different stocks with a market value of $1 million or more. Institutional investors, retail brokerage houses, and private corporations may participate in program trading. Program trading is designed to take advantage of inefficiencies in the market between stock prices and futures or options contracts. Bulk trading of stocks or options are executed at different times under strict market rules.

The present invention is intended to simulate, automate and perfect a method of security trading called "day trading."

Securities day trading involves carefully monitoring a security and deciding to buy or sell based on intraday movements of the price of the security together with consideration of when a stock will move in a trend or with momentum either up or down. Successful day trading depends on the ability to recognize a trend or momentum, timely execution of a buy or sell short order and determination of when to exit the transaction. It is also important to know when to stop losses. Frequent buying or selling of a security is commonly done by a day trader throughout the day.

There are different methods of day trading. One popular method is to track and trade volatile securities by attempting to buy when the security is moving up and sell or sell short when the security price is moving down. To determine when a stock will move

with momentum higher a trader often refers to price movement of the security together with the volume of trades and other information.

Another day trading method involves monitoring a specific stock that usually makes little movement in price during the trading day. The day trader attempts to exploit the spread between the prevailing bid and ask to make a small profit. This method requires repeatedly buying and selling where the profit can be on the order of 1/16th or 1/8th of a point. This method also requires stopping losses by quickly exiting a transaction that is not profitable. This is one version of a method of trading commonly referred to as scalping.

The instant invention can automate many if not all day trading techniques including but not limited to the two aforementioned methods.

The movement of stock prices in trends has been a long established tenant of technical analysis. John Magee established the following three principles: (1.) Stock prices tend to move in trends; (2.) Volume goes with the trends; and (3.) a trend, once established, tends to continue in force. A trend is usually considered a longer term movement of a stock while momentum involves a shorter term movement in stock price. This instant invention can be used to track and trade both momentum and a trend.

However, unlike traditional technical analysis that looks for long term trends the instant invention is used to interpret a trend or momentum on a moment by moment basis and enter into a transaction with speed.

Some of the data that can be monitored in order to determine the trend or momentum of a security include the following: price; bids; asks; spread between the inside bid/ask; number of shares on the bid or ask side; time and sales; and, the actions of market makers and specialists. In addition general market data can be monitored such as the S&P 500 futures contracts that portend the future movements of the market. There is a plethora of data to analyze and consider before deciding whether to enter into a transaction.

Most of this data can be monitored in real-time by a day trader with the information streaming across the traders computer screen. One of the difficulties in day trading, unanswered by prior art, is the ability to analyze the large volume of data and timely decide whether to enter into a transaction. The difficulty is even more apparent when an attempt is made to monitor and trade more than one security. Delays of a few seconds can make the difference between catching momentum or a trend near its start, middle or end. Another problem, unanswered by prior art, is the ability to enter the appropriate buy/sell order quickly and have it executed quickly. The instant invention provides solutions to these problems.

The present invention is intended to automate the processes used in successful day trading by analyzing the real time streaming data before automatically buying or selling a security. The data is analyzed in real time allowing the system to evaluate whether to enter into a transaction within a very short period of time.

NASDAQ level II data provides the greatest information about the current market for a specific security. Level II provides detail about all the bids, and asks including the identity of the market maker for the bid/ask and numbers of shares offered. It also provides a listing of the number of shares and time that they were sold. NASDAQ level II provides the greatest amount of data to facilitate the buy or sell decision. The instant invention is intended to work with both the NYSE and the NASDAQ or any future evolution of these organizations. It has applications on all stock exchanges including Electronic Communication Networks (ECN).

The present invention analyzes security data before entering into a transaction. Analysis of security data involves the following: looking at discrete components of the data; performing calculations; comparing the data to recent historical data; and, and in some cases giving a weight to the data. The analysis is user driven based on their selected areas of focus.

The system first requires the user to identify the securities to monitor and transact. Symbols for securities are entered into a database along with additional information.

The system next allows the user to develop a decision model for transacting the security. A decision model can be developed for each operation in the exchange process. This allows the user to establish a separate decision process for a buy, sell, sell short, and buy to cover (a short).

A decision model is developed by the user through designating the following information: levels of decision; relationship of levels; components to consider at each level; and, defining decision points or ranges. Pre-developed decision models may be offered by the system.

Levels of decision refer to a single component or grouping of components that can be compared to another grouping. There are an unlimited number of levels allowed however in practical application few will be used.

The user defines the relationship between the levels by assigning Boolean operations (such as: and, or, not). For example, an "and" operation can relate Level 1 and Level 2.

Components refer to elements of data for a security or market or a function of the element. Components can also be based on recent historical data in a database or a function of this data. The database is compiled from the real time data for the security and can contain information about its price, volume, sales, number of trades, and actions of market makers.

Examples of components include but are not limited to the security's price, volume, spread, and number of shares and their price on the bid/ask. Components can also include but are not limited to, NASDAQ composite level, S & P futures, and bond prices.

An example of a component derived from a database includes information about what the historical volume was at a certain price level.

The user can select what data will be stored in a database for use in a component. A relationship of how the data is stored can also be established. For example a database can be established to record the volume of shares traded and number of trades made at each price level a trade is made for a particular security. This can aid in identifying support and resistance at different price levels for a security. A component can be defined to look at the data in the database and analyze the current price in relationship to approaching support or resistance levels.

Components can be grouped at each level to give a combined effect. The user determines what components, if any, to group together at each level. The instant invention allows for bringing together disparate data for analysis and incorporation in a decision model.

After selecting the components to consider the user will have the flexibility to select an equation that establishes a function of the raw data for the component. The type of equation and function of data will depend on what type of relationship, if any, between the separate components the user intends to build at a particular level. There are several options for establishing a relationship between components available. These include but are not limited to the following: 1. weighted data summation; 2. interaction or intersection; and, 3. singular values.

In a weighted data summation relationship equations are selected for purpose of giving the component a weighted result that can then be combined with other weighted data to produce a combined effect. For the interaction or intersection method a relationship can be based on interaction between two components such as a moving average of price intersecting with a shorter term price moving average.

In a weighted data summation relationship the continuum between what is considered a high value and a low value will be established in the component's equation. The continuum between the high and low can be established as linear, logarithmic, exponential, or as some other function of the data over time.

In the weighted data relationship the equation selected will also be used to give weight to the component compared to the other components at the specific level. For instance at Level 1 the price component could be 30% of the decision making process, volume component 20% of the process, spread analysis component 25% and S&P futures component 25%.

The weighted data is then used to determine if it is an appropriate time to enter a buy (sell, sell short, or buy to cover) order for the security. This is done by comparing the aggregate of the Components to a user defined decision point or range.

A decision point is the point where the component or combined effect of the components at a specific level reaches a trigger that the level has satisfied its criteria to proceed. For

example if there was only one level of decision for a "buy" determination and the data in the component(s) in that level has reached the decision point then a buy order will be issued.

Next is an illustrative example that demonstrates the application of the user defined decision model for the instant invention. It is offered for illustrative purposes only and not as a limitation. It is one of countless variations and combinations available.

The example will look at a decision model for whether or not to buy a security. Similar considerations could apply to a sell, sell short or buy to cover model. The example will consider a three Level decision process for the buy model.

Level 1 will have the single component of price movement for the security. Level 2 will have the three components of volume, spread analysis and S&P futures. Level 2 will use a weighted data summation relationship of the components. Level 3 will have two components including a longer term moving average of price and a shorter term moving average of price. The relationship between the Level 3 components will be the intersection of moving averages.

The relationship between the three levels will be the Boolean "and" meaning all three must reach their respective decision points to signal a buy.

Level 1 will have a decision point of reaching a specific price increase over the prevailing price before decreasing in price. For example the Level 1 price increase can be 1/4 point. This means that the price must have moved up by at least 1/4 point before going back down to satisfy the Level 1 decision point.

The Level 2 decision point will be established as the number 75 where all Level 2 components give a potential total of 100. For Level 2 assume that the volume component is 50% of the decision, spread analysis 25% of the decision and S&P Futures 25% of the decision. Equations are assigned to these components giving a possible total of 100 where the volume equation offers a range of 0 to 50, the spread analysis equation offers a range from 0 to 25 and the S&P Futures offers a range from 0 to 25. Level 2 will then reach its decision point when the combined data fed into the equations for the components reaches 75.

For Level 3 the decision point is the intersection of the two trailing moving averages. When the shorter term moving average intersects or exceeds the longer term moving average this will satisfy the decision point.

If Level 1 reaches its decision point of 1/4 point price move and Level 2 reaches its decision point of the total weighted data greater than or equal to 75 and Level 3 reaches its decision point of the shorter term moving average intersecting or exceeding the longer term moving average then the decision model will recommend a buy order. If any of the Levels have not reached its decision point then the system will continue to monitor the

real time data for the security until the criteria for the decision model are satisfied or the system is halted.

As can be seen by the above example the instant invention offers the user flexibility and power in establishing decision models. The flexibility is not only in the use of Levels, Components and their relationships but also in types of data that can be integrated in a Component.

A few of the more popular components are identified here (and in the description of drawings) however the instant invention can incorporate many others.

One component that will frequently be used is related to the volume of shares sold. An increase in volume usually signals that the price is about to move -- either up or down. This component can be assigned a mathematical equation to represent changes in volume on a moment by moment basis. For example, the equation could be a moving average of the volume.

A volume component can also be based on a database of volume at different price levels. Since high volume at a price level can signal a support or resistance level this type of component can be used to anticipate future buying or selling pressure at or close to a price level. For example, a component could be based on the volume stored in the database at certain price levels. Alternatively, a component could be based on a moving average of historical volume that is in the database.

Additional components that can be taken into consideration involve the bids and asks for the security. The best bid or ask is referred to as the inside market. On NASDAQ level II the outside bids or asks are also displayed. A significant differential in the number of total shares being offered on the bid or ask may represent pressure for the price to move higher or lower.

The instant invention will allow the user to analyze the outstanding bids and asks by looking at the total number of shares offered on the inside market on the bid side compared to the ask. It will also allow for analysis of the number of market makers on the bid or ask. An additional comparison can be made for total number of shares offered on all (inside and outside) bids and asks. In a weighted data method a mathematical equation can be assigned to set the limit as to this component's total impact on the decision making process and to allow it to be combined with other components.

The "spread" is defined as the difference between the inside bid and ask. During the trading day the spread for a security can vary. The larger the spread usually corresponds to greater volatility for the security. The price a security is bought or sold frequently is closer to either the bid or ask side of the spread. When the selling price approaches or is at the inside ask the trend or momentum of the stock is usually up. Conversely, when the selling price approaches or is at the inside bid the trend or momentum is down.

To incorporate this into the analysis and decision making process an equation may be assigned to give a stronger buy signal as the selling price approaches or in some cases exceeds the inside ask and give a stronger sell signal as the selling price approaches the inside bid. As with the others the equation used will determine this component's total impact on the decision making process and allow it to be combined with other components.

Other components that may be added to the decision making process are information about the market in general including indicators such as the S&P 500 futures contract or the NASDAQ futures or composite. These indicators traditionally lead the market in the direction it is going. An equation can be used to determine this components total impact on the decision making process and allow it to be combined with other components in a weighted data format.

The activities of market makers can be monitored and followed by assigning a value to specific market makers and tracking the presence or absence of market makers from the bid or ask. A component can then be assigned to follow the movement of one or more market makers.

Traditional methods of technical analysis can also be incorporated into the analysis at least to the extent that it can be modified to perform with real-time data and intraday analysis. An example of traditional technical analysis is the moving average of the security price. Another frequently used technical analysis process is the monitoring of support and resistance levels. As discussed in detail both infra and supra the instant invention can track support and resistance levels with a database.

The instant invention is intended to allow the user the ability to combine the components discussed above or other components in whatever manner the user determines will give the desired result of profitable trades. For instance a trading system can be established that will look at price, volume, and spread only in the decision process. Another system could include price, volume, number of shares on bid or ask and S&P 500 futures data.

There will be virtually an unlimited number of combinations of components that can be incorporated by the user in the decision making process. This flexibility is in recognition of the fact that no single system will work all the time. The user may find that different stocks perform better under different combinations of components.

After the decision model is established for those activities that the user wants the system to perform (buy, sell, sell short, buy to cover) the system can be activated to monitor real time data for the securities selected and enter into transactions. Transactions will be directed though the Internet (or other high-speed data transmission methods) to a brokerage or directly to an electronic communication network such as Island or directly to the exchange.

The instant invention allows the user to enter options or select from available options for how the transaction will be processed. Options for what preference to give to a particular

exchange when more than one is available for the security will be offered. Options as to what type of order from a bid, ask, or market order to a SOES order will be available. The user can define when each alternative will be used.

After an order is sent to the exchange the system will next record in a transaction database information about the outstanding order and monitor the progress of the order. Continued monitoring will record when the order is filled and the fill price. During this time the system will continue to monitor the real-time data for the security and may cancel the order if the system determines that the transaction (for example a buy) is no longer appropriate.

After it is confirmed that a transaction has been filled then the system will update the transaction database and monitor for when to sell a bought or buy to cover a shorted security. There are at least two ways that the system will determine when a sell or buy to cover is appropriate. The first manner is when the decision model for a sell or buy to cover reaches its decision point activating a sell or buy to cover order.

Floating stop

The second way that a system will determine when to sell or buy to cover is through a "floating stop." This is a method to ensure that a profit is locked in or to minimize a loss. This is a variation from the traditional stop order placed with a brokerage firm. For a traditional stop a specific price is selected that a security cannot go below without turning into a market order and selling. A limitation with the traditional method is that it requires the security owner to continually change the price of the stop order if the price goes higher and the owner wants to lock in some profits while allowing the stock to continue to increase in value.

Novel

Another problem with the traditional stop order is that a specialist or market makers may be aware of its existence allowing them to stop out a position and then move back to higher offering price. The instant invention offers a solution to the problems associated with the traditional stop loss.

In the instant invention a traditional stop loss order is never placed. Instead, the system constantly monitors the stock and instantly places an order based on moment by moment monitoring of the stock price. Since a stop loss order is never placed the instant invention uses what is termed a "floating stop."

For a floating stop the system user selects the amount that the current price of the stock can deviate without the system issuing a sell order (or buy to cover in the case of a short position). For example the selected floating stop could be 1/8 point or 1/2 point. This amount then becomes the maximum amount that the price will be allowed to deviate from the current price before a sell is indicated.

The floating stop loss can also be set to allow a greater fall back based on continued advancement of price. This is referred to as a dynamic floating stop. The initial floating stop of for example 1/8 will increase as the price continues to increase over the purchase price.

As an example consider that XYZ stock is purchased at $35 and that a floating stop of 1/2 point is part of the system database for this stock. If the stock continues to rise in price then the system will monitor its rise. If the price goes to $40 but then begins to retreat then the floating stop will prevent it from going more than 1/2 point down from $40 before issuing a sell order.

If the XYZ stock purchased at $35 begins to immediately drift down in price then the floating stop will require the system to issue a sell order at 1/2 point lower than $35. This prevents a continuing loss on the transaction.

As an example of a dynamic floating stop a price increment of 1/4 point can be set to increase the base floating stop for every 1 point increase in price. If the XYZ stock is purchased at $35 and rises to $40 then the dynamic floating stop will allow the price to retreat $1.25 before issuing a sell order. A dynamic floating stop allows more breathing room once a stock price moves in the user's favor. A dynamic floating stop can have a maximum amount that it will be allowed to increase. For example a maximum could be set at $2.00. Using the previous example this means that regardless of how high the price of XYZ stock goes it will be sold if it retreats in price by $2.00 or more.

Once a transaction is reversed through either the appropriate decision model or a floating stop loss the transaction information will be recorded in the transaction database. This will allow the user to monitor profits or losses and tweak the system to offer better results. Analysis of the results of trading will give insight into the validity of the decision models used.

The system can also be allowed to work in "learning mode" where real-time data is analyzed and trading points are recommended by the system but are not initiated. Entries made in the transaction database will reflect recommendations and not actual transactions.

In a preferred embodiment the instant invention will allow the user to perform statistical analysis of the performance of the system on historical data for a security. This allows the user to "tweak" the decision models.

Additional statistical analysis can be done to determine the probability of continued movement of stock price up from one incremental move up before moving down. For example when the price moves 1/4 point up what percentage of the time will it move 1/8 point higher before moving down. This can be used to determine what incremental increase in price will be used in the price component of the decision making process.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 illustrates hardware and alternative connections to security data source and stock exchange.

Fig. 2 illustrates an overview flowchart of a first embodiment.

Fig. 3 is an illustration of databases and their data inputs for a first embodiment.

Fig. 4 is a flow chart depicting security data input and validation.

Fig. 5 is a flow chart showing a first embodiment of data analysis and decision process.

Fig. 6 is a flow chart showing detail of a decision process for a buy example.

Fig. 7 is a flow chart showing detail of further decision processes with a buy example.

Fig. 8 is a flow chart showing security order preparation and processing.

Fig. 9 is a block diagram illustrating an order execution preference.

Fig. 10 is a flow chart illustrating an embodiment of a floating stop loss.

DETAILED DESCRIPTION OF THE INVENTION

The method and apparatus of the present invention will now be discussed in greater detail and with reference to Figs. 1 to 10.

For a more detailed understanding of the invention; reference is first made to Fig. 1 of the drawings. This figure illustrates the apparatus and hardware of the system. It also illustrates the alternative connections to data sources and stock exchanges.

The apparatus and process of the present invention may be implemented on many types of computer systems. This includes personal computers (PCs), laptop computers, mini-computers, and mainframes. Operating systems include but are not limited to Windows (NT, 98, 2000, etc.), Apple OS, Linux, and Unix. The apparatus and process may also be implemented on a client/server network with a server connected to several client workstations. In a separate embodiment it may be implemented on the Internet allowing end users access through an Internet based server.

As depicted in Fig. 1 an anticipated frequent implementation includes a PC unit **101** with a state of the art: central processing unit (CPU); mass storage device (hard disk drive, CD, CDRW, etc.); monitor; keyboard; printer **102**; and, pointing device such as a mouse.

Fig. 1 also illustrates the alternatives for connecting the selected computer system to sources for security data and security markets or exchanges. An anticipated frequent implementation will involve connection to both the data source and exchanges through the Internet, step **104**. The connection to the Internet can be by methods including but not limited to the following: dial-up modem; cable modem; digital subscriber line (DSL); high data rate wireless technology (HDR); xDSL; ISDN; T1 line; T3 line; dedicated line; and satellite.

An alternative non-Internet connection to the data source and/or security exchanges is available by methods **103, 105** including but not limited to the following: modem; cable modem; HDR; DSL; ISDN; T1; T3; dedicated line; and, satellite. In this method intermediate steps known to those skilled in the art may be required.

The referenced security data source **106** includes any source for real-time security data. The data source must provide the specific security data in real-time rather than delayed. There are several third-party vendors for real-time security data. By way of example only and not limitation, a company named BRIDGE provides security data through products called BridgeFeed and BridgeChannel. Another company, S&P Comstock provides Internet delivered data and high speed CSP delivered data. There are several vendors and several options available.

The data of special interest includes all data related to trading of the particular security that can be generated during trading hours. This includes but is not limited to the following: price; bids; asks; volume traded; time and sales; identity of market makers; activities of market makers; and, activities of specialists. Additional data about the market in general may be requested to evaluate the overall direction of the market. Examples of additional data about the markets includes but are not limited to the following: NASDAQ volume and level; Dow volume and level; and, S&P futures.

As depicted in Fig. 1 section **107** the connection to a security exchange can be through the Internet or other methods as previously described for the security data. The connection can indirectly go through an Internet brokerage or directly to the exchange. The method and apparatus of this system is intended to work with all equity security markets and exchanges including the NYSE, NASDAQ and various ECNs such as ISLAND.

The source for both the data and connection to the exchanges could be through the same Internet brokerage.

Units **108** and **109** represent a hand held computer and a portable computer that may be used for remote access of the system. Remote access can be directed through the Internet or directly to the host computer.

In a separate embodiment the method and apparatus of the invention could be implemented as an option for trading available through an Internet brokerage. In this

embodiment the user would log onto an Internet brokerage that would have resident on its system the method and apparatus of the invention.

Fig. 2 illustrates the method of the system in overview. The system consists of a method for inputting and analyzing security and market data (sections **209, 210**), determining if an order for a buy, sell, sell short or buy to cover should be issued, based on user defined decision models, and then promptly submitting orders for execution (sections **212, 213**). As illustrated in Fig. 2 there are two primary databases (units **208, 211**). One contains data for selected securities that the system user intends to monitor and trade. Another database contains data for transactions (or pseudo transactions in learning mode) as a result of operating the system. It is anticipated that there will be a need for other databases to store system parameters and preferences. Additional databases of historical security data used in decision modeling are discussed infra.

The system is intended to monitor and transact more than one security. However, due to the CPU intensive operations of monitoring real-time data and performing mathematical operations as part of the decision models it is anticipated that a limited number will allowable. As processing power increases with more powerful systems including minicomputers and as smaller systems gain in processing power more securities can be monitored and transacted.

Fig 3., section **314** illustrates some of the data that the user will be required to input into the system before it can be activated to monitor data and enter into transactions. Fig. 3 also illustrates the establishment of databases for recording recent historical security data. First, the system requires the input of the symbols for the securities to monitor. Examples include IBM -- International Business Machines or PCLN -- Priceline.com.

For each of the selected securities additional information is required. The system will prompt for information necessary to build decision models. For each security a separate decision model can be developed for the processes of buying, selling, selling short and buying to cover. Additional information requested for each decision model includes the following: 1. Number of levels of decision; 2. Relationship of the levels; 3. Components and databases; 4. Relationship of the components; 5. Equations or formulas; and, 6. Decision points or ranges. Each area of additional information is discussed in greater detail below.

1. Number of levels of decision

A "level" refers to a separate grouping of components in the decision process. There must be at least one level and there may be several but in most applications only a few will be appropriate. The user will be required to enter ~~a~~ the number of levels of decision from 1 to n.

For example one level can be selected and it can contain two components. Alternatively, four levels can be used with the first two using a single component and the next two using three and four components respectively. An unlimited number of combinations are available.

In the decision process a level will return a true or false value. A level returns a true or false value depending on whether the components have reached their decision points or range.

2. Relationship of the levels

The relationship between levels refers to the decision process as it relates to the levels. In general, a Boolean operation [such as and, or, not] will be used to compare the levels for making a decision. For example a decision model could have two levels with the following relationship: Level1 <and> Level2. An alternative model could employ three levels with the following relationship: (Level1 <or> Level2) <not> Level3. The user have virtually unlimited discretion in the relationship of levels.

3. Components and databases

A "component" is an assigned function of data for a security, or market in general. With few exceptions the only data of interest will be dynamic and available in real-time. Security data includes but is not limited to its: price; volume; bids; asks; spread; number of shares at each price level of bid; number of shares at each price level of ask; time and sales; actions of market makers or specialists. Market data includes but is not limited to the following: NASDAQ volume or level; S&P futures volume or level; and Dow volume or level. There can be more than one function of a certain data type.

For example, a component could be a function of volume traded for a security. Another component could be a function of how close the current price is to the inside bid or ask. A third component could be a function of the S&P futures. The group of components available is only limited by the data accessible for a specific security or market.

A component can also be a function of historical data retrieved from a database for a security. Units **318, 319, 320** illustrate the databases that can be established for creating a source for component data. To create a component database the user defines what data or function of data to place in the database. Any of the available security data that can be incorporated into a component can also be placed in a component database. It is anticipated that a frequently used component database will relate to the volume of shares traded and number of trades made at a specific price level. This type of component database can be used to identify support and resistance levels. A component can then be established to anticipate buying or selling pressure based on looking at the database for how actively the security was traded as it in the past approached a certain price level.

As illustrated by units **318**, **319** and **320** several component databases can be established for each level in the decision model. An unlimited number of component databases can be established for each separate decision model.

The instant invention will offer the user a selection from an offering of the most commonly used components and component databases. Other components or functions of data may be customized. Examples of components and component databases are illustrated in the background and summary of the invention.

4. Relationship of components

As previously identified in the background and summary of the invention there are at least three ways of defining a relationship between the components on each level. These include but are not limited to the following: 1. weighted data summation; 2. interaction or intersection; and, 3. singular values.

Each level can combine more than one component. In the intersection or interaction relationship the components may have a relationship that allows them to be combined to produce a net result. For example one component could be a moving average of price for the preceding thirty ticks of data. Another component could be a moving average of price for the preceding ten ticks. A relationship could then be established where if one moving ive average crosses the other then the condition (buy, sell, etc.) for the level has been met.

In the weighted data format the components are assigned equations that gives weight to the data. For example one level could have three components. The first component could be a measure of volume. The second component could be a measure of price change. The third component could be a measure of how close the price is to the inside bid or ask. A relationship could then be established where the volume component is 20 % of the total, the measure of price change could be 30% of the total, and the spread 50% of the total. This means no matter how high the volume goes it can only contribute 20% to the total deciding factor.

A significant value of this method is that it allows a combining of data that does not easily lend itself to comparison. It also allows for creating a sliding scale for each component that when combined produces a sliding scale of the total where no one component exclusively controls the net result.

5. Equations or formulas

Each component can be assigned an equation that works as a function of security data. The assigned equation serves more than one purpose. First, the equation will be a function of the data that gives it meaning. Second, the equation in the weighted data relationship will establish a continuum between low and high values. Third, in the weighted data format it can be used to give a weight to the data that can then be combined with other weighted data to give a combined result.

The user will be given options of equations for a component as part of the component selection process. Alternatively, a customized equation can be entered.

6. Decision points

A decision point refers to the moment data entered into a component reaches a predetermined level that satisfies the users criteria, in that component, for making the decision to buy, sell, sell short or buy to cover. A decision point can be a number, range of numbers or interaction between functions. For example a decision point could be when the price of a security increases by 1/8 point. It could also be when the average volume falls within a certain range. In addition a decision point could be when two

different trailing averages intersect. The user has wide discretion in the definition of decision points.

This concludes a discussion of the information incorporated into a decision model. The user is free to develop a customized decision model or to use one that is prepared by someone else or available as an option with the system.

As illustrated in Fig. 3 unit **315** additional information will also be requested apart from the decision models. This information will be maintained in a database (unit **316**).

This includes information about the total number of shares that the system should buy or sell short. It also tells the system how many shares should be bought or sold in a single transaction.

As in Fig. 3 information about holding periods, circuit breakers, exchange preferences and additional data will also be requested. Holding period refers to issues such as whether to hold a security over night or have a mandatory sell at the end of the day.

Circuit breakers refer generally to trigger points that require a halt in part or all trading. An example could be when the system executes too many trades in a given time period. Another example of a circuit breaker is when the system achieves a level of draw down that is not acceptable. Several circuit breakers may be offered.

Exchange preferences refer to user defined preferences for the particular exchange ~~to use~~ and the type of order to execute. For example all trading could be limited to one ECN such as ISLAND or spread around to several. In addition the order to buy could ~~be~~ always at the market or at the inside bid. Several options will be available.

Fig. 3 also illustrates some of the information requested for the system database (unit **17**). As illustrated there are several areas of information including: system circuit breakers; brokerage and account information; access method to brokerage; access method to real-time data; and, additional information.

System circuit breakers apply similar types of consideration as the circuit breakers for specific securities as discussed above. An example could be the maximum amount of draw down for the system including all securities being traded. Another example of a circuit breaker could be an event such as the markets shutting down. Several circuit breakers will be offered.

Information about brokerage, account and access to data will tell the system the parameters it must work under for buying and selling securities and accessing data. ~~Reference to Fig. 1 provides additional information.~~

Fig. 4 illustrates an embodiment for data input and validation. Once activated to monitor data and enter into transactions (or pseudo transactions in testing mode) section **418** will first look to the security database **419** for the identity of securities to trade and detailed

information about the security (see Fig. 3). Section **418** will request the data from a data source (**420** and Fig. 1) and input it (unit **421**) into the system. Section **422** represents a validation process to determine if the data has been received properly.

Validation can include comparing the data to previous like data and determining if it falls within a range or standard deviation from the previous data. If an error is detected and the data source allows, an error message can be sent back and a new request made. Repeated invalid data can cause a halt in trading for a particular security or the system in general.

Once data is validated it is processed into the decision models for a security or securities. It may also be compiled into a database to allow a decision model to look at recent historical data. Fig. 5 represents the data analysis and decision process. In process **524** the data is input into the components of the decision models for the securities. The decision models with corresponding components comes from database **525** as discussed in reference to Fig. 3.

Unit **538** illustrates data being input into one or several different component databases. The component databases are then incorporated in the decision process as illustrated in item **526**.

Item **526** illustrates the process of calculating the results of the data in the components of the decision models and comparing the results to decision points. This is discussed <u>infra</u> in greater detail in reference to Fig. 6.

As a result of process **526** a decision may be made to buy, sell, sell short or buy to cover a security. This is illustrated in items **527, 528, 529, 530**. The decision to buy for example is only available for a specific security if the user selected that option and built a buy decision model during setup. If a buy, sell, sell short or buy to cover order is not appropriate pursuant to a decision model then the system continues to monitor the decision models in process **526**. The system will continue processing data through the input and decision models until the system is halted by the user or by other system parameters.

If a decision is made to buy, sell, sell short or buy to cover then the system will proceed to step **531** where additional considerations are taken into account before a transaction is entered into. The embodiment of the process in step **531** is discussed in greater detail in reference to Fig. 7. This step looks at whether to proceed based on several factors. For example if a buy decision is made one factor will be whether additional shares can be purchased based on how many are already owned.

If a transaction is appropriate then the system proceeds to step **533** where consideration is given to the best route to an exchange and an order is prepared. The security database **532** (Fig. 3) will provide the preferences for trading the security. For a specific security the user can select to trade on one or several exchanges.

Since the advent of ECNs such as ISLAND a trader has more than one choice for where to trade securities. Sometimes an ECN will allow for an improved price over the traditional exchange such as the NASDAQ. The determination of using one exchange over another will be based on the liquidity of the security on that exchange and the best available price. For example a transaction on ISLAND many allow for a 1/8th point price improvement over another exchange. In step **533** the system will determine the best exchange based on user defined preferences and a securities price and liquidity.

In process **534** the order is sent to the exchange. The method for sending the order will be either through the Internet or other methods as discussed in reference to Fig. 1. At the same time that the order is sent to the exchange an entry is made in the transaction database **535**. The entry in the database will include information about the transaction including but not limited to the following: time and date of order; security symbol; number of shares; type of transaction (buy, sell, sell short, or buy to cover); identity of exchange; price of order; type of order (market, bid, ask); and status (pending, filled, error etc.).

Process **534** will also monitor the progress of the order for execution. If the order is not filled within a prescribed amount of time then the transaction will be either canceled or modified and resubmitted. For example a bid to buy at a certain price may not be executed if the price moves up too quickly. The system may react by either resubmitting a higher bid or canceling the order. Step **537** illustrates the check for whether the order is timely filled and the process **536** for handling errors and resubmitted orders.

Any response including errors messages to an outstanding order will be recorded in the transaction database **535**. If and when the order is filled an entry will be made to reflect the time of the fill and the transaction amount.

Fig. 6 illustrates an embodiment of a decision model for a buy decision. A similar embodiment can apply to a decision model for a sell decision, sell short decision or a buy to cover decision. Process **638** illustrates a Level1 of the decision model. As discussed supra in reference to Fig. 3 there can be one or several levels in the decision model. Processes **639** and **640** illustrate the possible addition of Level2 and Level3. Process **638** describes a sum of weighted data for the components in Level1. This is but one of the options for defining the relationship between the components for Level1.

As illustrated in process **638,** for Level1 to be *true* requires that the sum of the weighted data be greater than or equal to its decision level. An example of process **638** is as follows:

If $\sum$ f(Comp_1) to f(Comp_n) $\geq$ DPoint1 then Level1 is *true*

In this example f(Comp_1) represents a function of security data for Component 1. Additional functions of security data for components are represented by f(Comp_n). The decision point for Level1 is represented as DPoint1.

As illustrated in process **639,** for Level2 to be *true* requires that there be intersection or interaction between the components. An example of process **639** is as follows:

If $\mathrm{f(Comp\_1)} \geq \mathrm{f(Comp\_2)}$ then Level2 is *true*

In this example the functions of Component 1 and Component 2 are compared as in one moving average of data can be compared to another moving average.

As illustrated in process **640,** for Level3 to be *true* requires that a component reach a specific value. An example of process **640** is as follows:

If $\mathrm{f(Comp\_1)} = \mathrm{Dpoint3}$ then Level3 is *true*

The above examples are illustrative of the different types of relationships available for each level of a decision model. There are unlimited variations as to the number of Levels in a decision model and the number and type of components at each level. The above example illustrates one of many options available.

Step **641** represents the final step of the decision model where the results of the separate levels are combined in an IF ... THEN Boolean logic type operation. In reference to Fig. 6 if the result of operation **641** is true then the system will proceed to prepare and submit a buy order for the security. For example if there are three levels and the relationship in operation **641** is represented as Level1 <and> Level2 <not> Level3 then for a buy decision to be made requires that both Level1 and Level2 have reached their decision point and Level3 has not reached its decision point. If this occurs then the decision model will reach a buy decision.

Fig. 7 illustrates the process for determining if a transaction is appropriate after a decision to buy has been made in the decision model. A similar embodiment can apply to a sell, sell short or buy to cover model. Steps **742, 743, 744,** and **745** are illustrative and not intended as a limitation of the type of additional considerations made before a buy order is sent to an exchange.

Step **742** illustrates the consideration of whether additional shares can be purchased based on how many shares may already be owned. For example the system can be set to purchase shares in 100 share orders for a maximum of 500 shares. Step **742** protects against ordering more than 500 shares.

Step **743** illustrates one of many circuit breaker mechanisms intended to stop trading under certain circumstances. In step **743** the circuit breaker is based on making too many trades within a prescribed amount of time. Step **744** illustrates a circuit breaker based on tracking draw down (i.e. net losses) for a specific security or the system as a whole. Step **745** represents the possibility of several other considerations before the final decision to buy the security is made.

Fig. 8 is illustrative of an embodiment for the process of determining the best type of order to submit and exchange to use. Process **846** will first look to the security database **848** for information about preferences the user has selected for an exchange. Next it will determine the exchange with the best price if any advantage can be found. The liquidity of the exchange will also be considered.

In process **847** the system will determine the best type of order to submit. Order types include: bid -- either high or low; offer -- either high or low; a Small Order Execution System (SOES) order; or a preference (to a specific market maker) order. The determination of what type of order will be executed will be based on a model similar to that displayed in Fig. 9. This model takes into account the current price momentum of the security and whether the order is for a buy, sell or sell short.

In addition to the Fig. 9 model the system will know the rules that apply for making each type of order. For example a SOES order will only work if there is a market maker at the inside bid for a buy or inside offer for a sell. An order to sell short usually requires that the last tick for the stock was up rather than down. There are several of these rules that apply in certain circumstances. It is an object of the invention to quickly and accurately comply with these rules.

Fig. 10 represents an embodiment of a floating stop loss. The instant invention provides a method for a stop loss that significantly differs from a traditional stop loss. A floating stop loss is function of the instant invention's constant monitoring of the market for the security. Rather than the traditional method where a stop loss order for a specific amount is sent to the broker, a floating stop loss is accomplished when the system determines to exit the transaction and immediately sends an order for execution. Another distinct advantage of the floating stop loss is that it can follow the advance of a security and exit at the moment the stock turns down.

A trading method can be developed where a security is bought according to a buy decision model and sold based on the floating stop loss rather than a sell model.

Step **1049** of Fig. 10 illustrates the basic concept of the floating stop loss when the security is owned. HPrice is a variable for the highest price for the security from the time of its purchase. CPrice is a variable for the security current price. BStop is a variable for the stop loss amount that the current price can differ from the highest price before requiring a sell order. BStop can be fixed at an amount such as 1/16th point and 1/4th point or it can be set to increase or decrease based on the continued increase in the security price. For example BStop can be set to increase 1/16th point for every point increase in price.

Step **1050** illustrates a floating stop loss for a security sold short. In this step LPrice is a variable for the lowest price for the security from the time that it was sold short. CPrice is a variable for the security current price. SStop is the variable for the stop loss amount. As in step **1049** SStop can be fixed at a specific amount or variable as the price changes.

Step **1051** illustrates the possibility of an additional consideration as part of the floating stop loss that will require the reversal of the transaction.